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WHAT IS CLAIMED IS:

- A projection optical system for projecting a pattern of a first object onto a second object, characterized in that said projection optical system is provided with birefringence correcting means for correcting birefringence of an optical element of said projection optical system.
- A projection optical system according to
 Claim 1, wherein said birefringence correcting means comprises at least one optical member having predetermined form birefringence.
- 3. A projection optical system according to

 15 Claim 2, wherein said at least one optical member is arranged so that a distribution, including a distribution of form birefringence produced by said at least one optical member, is effective to cancel the birefringence to be produced by an optical element of said projection optical system.
- A projection optical system according to
 Claim 2 or 3, wherein said at least one optical member is arranged to produce form birefringence on the basis
 of a diffraction grating having a period smaller than a wavelength used.

5. A projection optical system according to Claim 1, wherein said diffraction grating is provided on the surface of the optical element of said projection optical system.

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6. A projection optical system according to Claim 1, wherein said birefringence correcting means comprises at least one optical member having a predetermined stress distribution.

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7. A projection optical system according to Claim 6, wherein said at least one optical member is arranged so that a distribution, including a distribution of stresses produced by said at least one optical member, is effective to cancel the birefringence to be produced by an optical element of said projection optical system.

8. A projection exposure apparatus comprising:
20 an illumination system for illuminating a
first object with light; and

one of Claims 1 - 7, for projecting a pattern of the first object illuminated with the light from said illumination system, onto a second object for exposure of the same.

9. A projection exposure apparatus, comprising: illuminating means for illuminating a first object with slit-like light;

scanning means; and

a projection optical system as recited in any one of Claims 1 - 7 for projecting a pattern of the first object onto a second object while the first and second objects are simultaneously scanned in a widthwise direction of the slit-like light, at a speed ratio corresponding to a projection magnification of said projection optical system.

10. A device manufacturing method including a process for printing a device pattern on a substrate by use of a projection exposure apparatus as recited in Claim 8 or 9.

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